AgroThrive, Inc.
The Science of Organic Growth™
305 Vineyard Town Center #356
Morgan Hill, California 95037
www.agrothrive.net
PHONE (831) 675-2853
FAX (831) 675-2875
TOLL FREE (888) 449-2853

Central Coast Regional Water Quality Control Board
Mr. John Robertson, Executive Officer
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401

Jan 21, 2019**.**

Comments to Ag Order 4 Options Table.

To Whom It May Concern.

This is to thank you for the opportunity to comment on the Ag Order 4 conceptual framework and associated regulatory options. While I do not have necessary expertise and experience to contribute to the design of overall conceptual framework, I do have substantial expertise and experience with the role that organic matter and Microbiology play in soil profile, soil hydration, and soil moisture/nutrient retention (Macura, 2018). These factors are known to influence nutrient retention time in soil, soil moisture capacity, nutrient absorption by plants, nutrient cycling, and ultimately nutrient runoff (Jiao, et al., 2005; Chen, 2006). To this end I offer following comments:

Reduce Nutrient Overloading. It is well known that over the past 20 plus years growers everywhere have been using more nutrients than is needed to grow crops (Good and Beatty, 2011). Reducing nutrient loading to the actual needs of individual crops would reduce nutrient waste, and thereby runoff. Farmer outreach programs need to be renewed whereby known scientific data is communicated widely to growers and missing research identified and funded to achieve these goals.

Timed Fertilization. It is also known that crops absorb nutrients in cycles and according to the physiological needs of the plants according to the growth cycles of each crop (Gaskell et al, 2007). Thus, proper timing of fertilizer applications to coincide with the nutritional needs of the plants should be pursued. Management methods that encourage nutrient retention in soil, well designed nutrient cycling, and properly timed nutrient release need to be adopted and practiced with increased vigor.

Concurrent Organic Fertilizer and Chemical Fertilizer Applications.
Integrating organic fertilizers and biofertilizers with chemical fertilizer methods is increasingly gaining popularity with progressive farmers around the world. Benefits of this approach to farming cover all aspects of good farming practices including improvement in soil health, improvements in soil structure, increase in soil microbial activity, more efficient nutrient absorption by plants, reduction of the need for chemical fertilizers etc. (Chen, 2006).

AgroThrive, Inc., in association with University of Santa Cruz (UCSC) and Head Start Nursery (HSN), has conducted research on the effect of AgroThrive LF (2.5-2.5-1.5) NPK organic fertilizer on the root development of nursery stock of cauliflower plantlets as compared with conventional fertilizer 6-25-25 NPK. HSN grew same seed of cauliflower on the same soil mix under same growing conditions. One half of the trial was fertilized with AgroThrive LF and the other half was fertilized with 6-25-25. After 6 weeks scanning electron microscopy of the roots was done by UCSC scientists and attached photomicrographs were recorded (Macura D., 2017). From enclosed pictures it is evident that 1) AgroThrive LF stimulates root hair (and root biomass) growth as compared with much higher NPK chemical fertilizer. 2) AgroThrive LF resulted in much better root surface coverage with soil microbes than the roots of plants grown on conventional fertilizer, and 3) AgroThrive LF grown roots were populated by beneficial microbes inside the phloem cells (endophytes) as compared with the roots grown on conventional fertilizers.

The significance of these results is multi-fold. First, higher density, longer root hairs, and additional root mass, helps the plants increase efficiency in nutrient absorption as well as increased ability for materials exchange (absorption of water and minerals, delivery of exudates, etc.) by the epithelial cells in rhizosphere (root zone). Secondly, increased surface coverage of the roots by beneficial microbes, as well as the microbial culture establishment inside the roots (endophytes) results in microbial protection of plants from pathogens. This improves plant health. And, lastly, it is well known that endophytes, in addition to protecting plants from pathogens often produce plant growth hormones that improve plant growth (Tadych and White, 2018).

The end result includes but is not limited to: a) better root development. Many of our customers use AgroThrive products as soon as transplants are anchored, or after 3rd leaf if seeded. b) instead of 20% of conventional fertilizer, every time they fertilize. This results in reduced chemical fertilizer use, and additionally the remaining fertilizer is utilized more efficiently due to better root development. c) reduced pesticide use due to better plant health and reduced plant stress (Tadych and White, 2018, Benchwick, 2015).

In summary, reduction of both nutrients run off and pesticides can be achieved by using organic fertilizers such as AgroThrive LF, AgroThrive LFN, and/or AgroThrive LFK in combination with better fertilizer application timing with the crop growing cycle and its nutritional needs.

Other organic fertilizers as well as compost can be used to achieve similar results. However, AgroThrive is the only organic fertilizer that is made from high nutrient industrial food wastes by natural microbial digestion providing readily available plant nutrients and an inoculum of beneficial microbes that stimulate root growth and protect plants against pathogens. Other organic fertilizers need to be digested by the soil microbes before they can be absorbed by plants. AgroThrive products are also drip tape compatible. Other liquid organic fertilizers usually plug drip tape and other irrigation systems.

For further information about AgroThrive, Inc. and about AgroThrive organic fertilizers please visit our web site at: www.agrothrive.com, or call.

Respectfully,

Dragan Macura, M.Sc.

Founder, Owner, President, C.S.O., and C.E.O.
AgroThrive, Inc.
26775 Old Stage Road
Gonzales, CA 93926

408-607-7767

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Scanning Electron Mircorgraphs of 6-Week Old Cauliflower Plantlet Roots After Growing on AgroThrive LF (left slide) and Commercial Fertilizer 6-25-25 (right slide)

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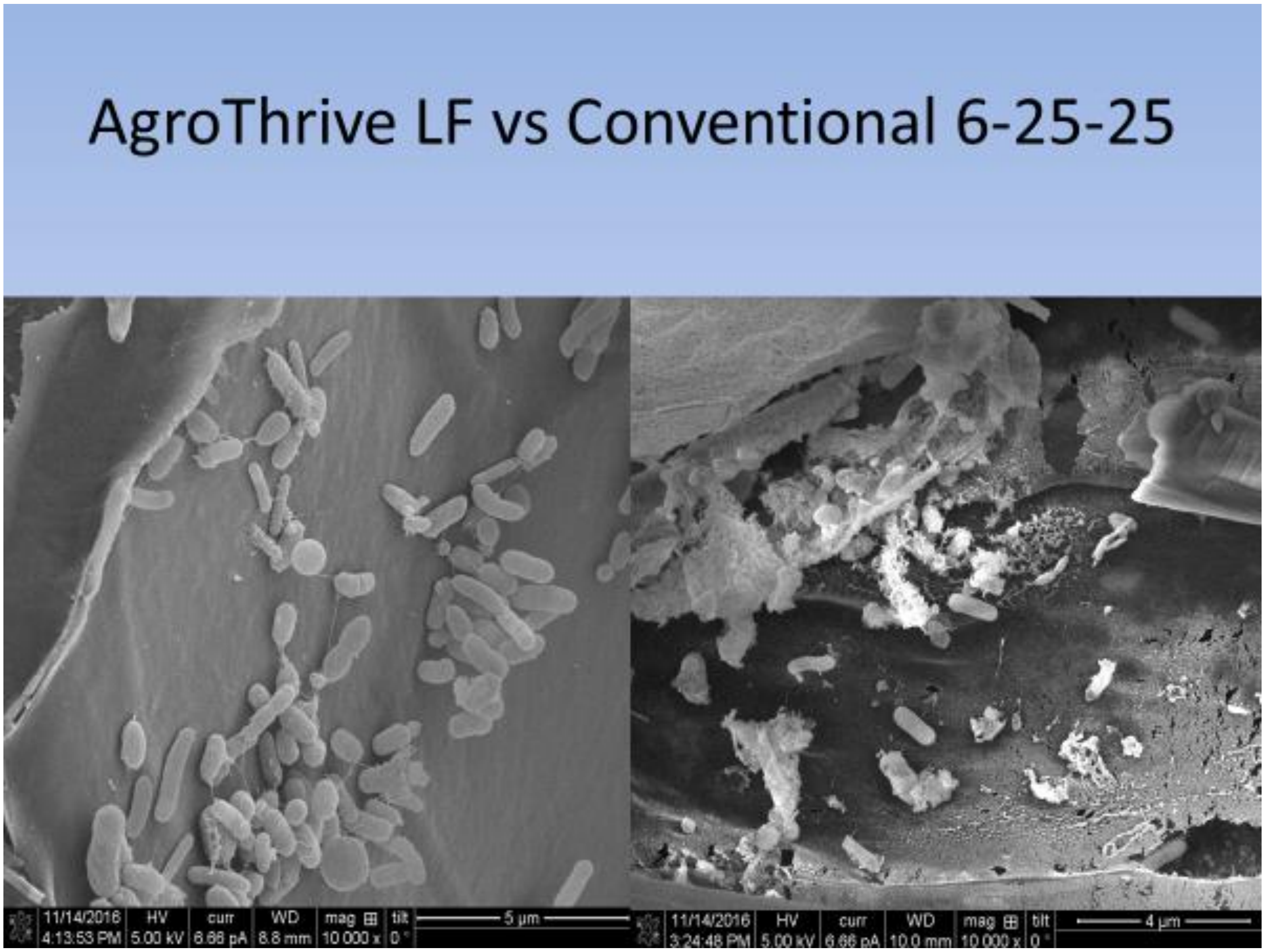
Root Hair Comparison of 6-Week Old Cauliflower Plantlets Grown on AgroThrive LF (left) and on Conventional Fertilizer 6-25-25 (right).



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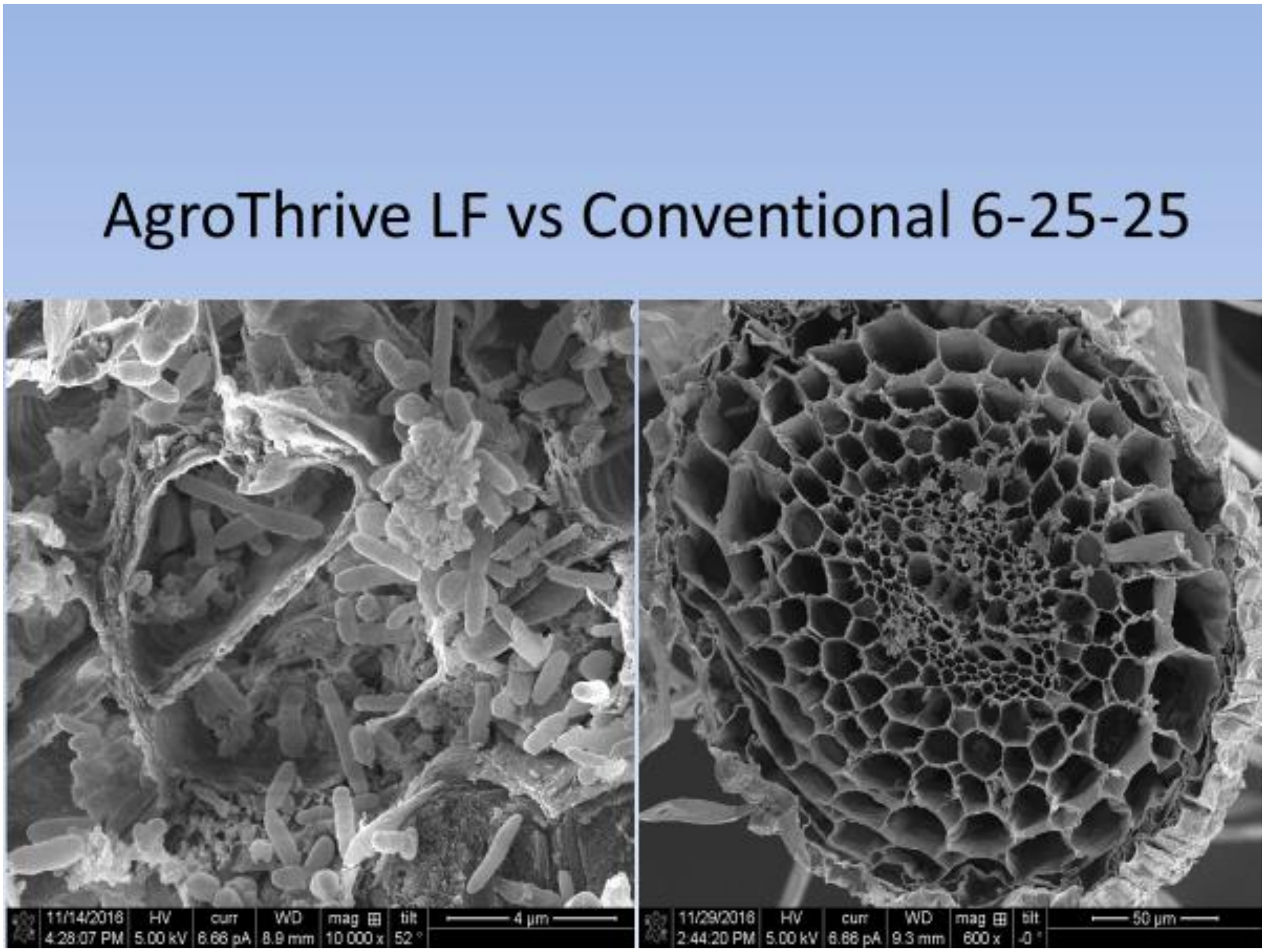
Microbial Biomass On Root Surface Comparison of 6-Week Old Cauliflower Plantlets Grown on AgroThrive LF (left) and on Conventional Fertilizer 6-25-25 (right).



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Beneficial Mircobial Population Inside Floem Cells Comparison of 6-Week Old Cauliflower Plantlets Grown on AgroThrive LF (left) and on Conventional Fertilizer 6-25-25 (right).